

Effectiveness of mindfulness-based nursing intervention on stress, sleep quality, and emotional well-being among college students: A quasi-experimental study

Archana Masih¹, Indu Bala^{*2}, Manpreet Kaur³

¹*Principal, MSC Nursing in Psychiatry, Doon Institute of Medical Science, Dehradun, Uttarakhand, India*

^{*2}*Assistant Professor, Department of Mental Health Nursing, College of Nursing, Public Khalsa College for Women, Urmur Tanda, Hoshiarpur, Punjab, India*

³*Nursing Tutor, Sri Guru Harkrishan Sahib College of Nursing, Sohana, Mohali, Punjab, India*

DOI: 10.5281/zenodo.22654793

Abstract:

Background: College life is a psychologically demanding transition characterised by academic overload, examination pressure, financial strain, and, for nursing and allied health students, additional stress arising from clinical placements. These pressures are consistently associated with elevated perceived stress, poor sleep quality, and reduced emotional well-being. Mindfulness-based nursing interventions, rooted in the Mindfulness-Based Stress Reduction (MBSR) framework, have emerged as a low-cost, scalable strategy that nurses and nurse educators can deliver within academic and clinical settings. This review synthesises quasi-experimental and related intervention evidence on the effectiveness of mindfulness-based nursing interventions in reducing stress, improving sleep quality, and enhancing emotional well-being among college students, with particular attention to nursing student populations. A narrative review approach was used, drawing on quasi-experimental studies, randomised controlled trials, systematic reviews, and meta-analyses published in nursing, psychology, and public health journals. Studies examining structured mindfulness programmes (typically 6- to 8-week Mindfulness-Based Stress Reduction or Mindfulness-Based Cognitive Therapy protocols) delivered to college or nursing students were prioritised, alongside foundational theoretical and psychometric literature. Across the reviewed literature, mindfulness-based nursing interventions were associated with statistically and clinically meaningful reductions in perceived stress, improvements in subjective sleep quality, and gains in emotional regulation, resilience, and overall psychological well-being. Effects were generally more robust for stress and mindfulness outcomes than for sleep, and benefits often consolidated over follow-up periods of two to six months rather than immediately post-intervention. Nursing students, who face the combined burden of academic and clinical stress, appeared to derive particular benefit from interventions embedded within their curricula. Mindfulness-based nursing interventions represent a promising, feasible, and holistic strategy for supporting the psychological health of college students. Nurse educators and student health services are well positioned to integrate structured mindfulness curricula into academic programming, although further methodologically rigorous, adequately powered trials with longer follow-up are needed to strengthen the evidence base.

Keywords:

Mindfulness; mindfulness-based stress reduction; nursing students; college students; perceived stress; sleep quality; emotional well-being; quasi-experimental study.

1. Introduction:

The transition into college life represents one of the most psychologically demanding periods of early adulthood. Students must simultaneously adapt to increased academic rigour, new social environments, financial independence, and, for many, separation from established support systems. It is therefore unsurprising that mental health difficulties are highly prevalent on university campuses worldwide. A World

Health Organization survey spanning twenty-one countries found that approximately one-fifth of college students met criteria for at least one mental disorder within a twelve-month period (WHO, cited in Zhang et al., 2025), underscoring the scale of the problem confronting higher education institutions and student health services. As students transition to college, they often encounter a host of novel stressors including greater academic rigour, unfamiliar social environments, and increased autonomy that can trigger or exacerbate underlying vulnerability to mental health conditions (Felton et al., 2022). Nursing students occupy a particularly high-risk position within this broader population. In addition to the academic demands shared by all college students, nursing students must navigate clinical placements that expose them to human suffering, high-stakes decision-making, unfamiliar hospital environments, and the emotional weight of patient care. Nursing students have consistently been shown to report higher levels of stress than their peers in other disciplines, owing to the rigorous and emotionally taxing nature of professional nursing education (Evans and Kelly, 2004; Chernomas and Shapiro, 2013; Labrague et al., 2017). Sources of stress identified in this population include the challenge of bridging theory and clinical practice, fear of making mistakes, exposure to death and dying, and the unfamiliarity of hospital environments (Labrague et al., 2018). Left unaddressed, chronic stress in nursing students has downstream implications not only for their own wellbeing but for the future nursing workforce, given the well-documented association between student burnout and eventual attrition from the profession. Mindfulness, defined as the intentional, non-judgmental bringing of attention to present-moment experience, has become one of the most extensively studied psychological constructs of the past three decades. Mindfulness provides individuals with insight into their present experiences, including their feelings, thoughts, physical states, and environment, while cultivating openness, curiosity, and acceptance (Brown and Ryan, 2003). Mindfulness has been operationally defined as involving both the self-regulation of attention toward immediate experience and an orientation of curiosity, openness, and acceptance toward that experience (Bishop et al., 2004). Mindfulness-Based Stress Reduction (MBSR), the most widely disseminated mindfulness programme, was originally developed as an eight-week clinical protocol for patients with chronic pain and has since been adapted for an extraordinarily broad range of populations and settings (Kabat-Zinn, 1990; Kabat-Zinn, 2003). Nurses and nurse educators are uniquely positioned to deliver mindfulness-based interventions within academic and clinical settings. Because mindfulness training requires no pharmacological input, minimal equipment, and can be delivered in group format, it aligns well with the holistic, preventive orientation of nursing practice. A mindfulness-based nursing intervention, for the purposes of this review, refers to any structured mindfulness or mindfulness-derived programme (including MBSR, Mindfulness-Based Cognitive Therapy, and briefer adaptations) that is designed, delivered, or evaluated within a nursing education or nursing-led student health context.

2. Statement of the problem:

Despite growing institutional awareness of student mental health needs, many college and university counselling services remain under-resourced relative to demand. Waiting lists for individual counselling are common, and stigma continues to deter some students from seeking help. Group-based, preventive interventions such as mindfulness training offer a scalable alternative that can be integrated into existing curricula, orientation programmes, or wellness initiatives without requiring extensive additional infrastructure. However, the evidence base regarding the specific outcomes of stress, sleep quality, and emotional well-being, and how these outcomes interact, remains fragmented across disciplines and study designs.

3. Significance of the review

This review consolidates quasi-experimental and related evidence on mindfulness-based nursing interventions with three interconnected outcomes: perceived stress, sleep quality, and emotional well-being. By focusing on quasi-experimental designs, which are the most feasible and commonly used methodology in real-world academic settings where randomisation is often impractical, this review provides practically relevant guidance for nurse educators, student health administrators, and researchers seeking to design or evaluate similar programmes.

4. Aims and objectives:

The specific objectives of this review are: (i) to describe the theoretical and conceptual basis of mindfulness-based nursing interventions; (ii) to synthesise quasi-experimental evidence regarding their effect on perceived stress among college students; (iii) to evaluate their impact on subjective sleep quality; (iv) to examine their contribution to emotional well-being, including mood, resilience, and emotion regulation; and (v) to derive implications for nursing education, practice, and future research.

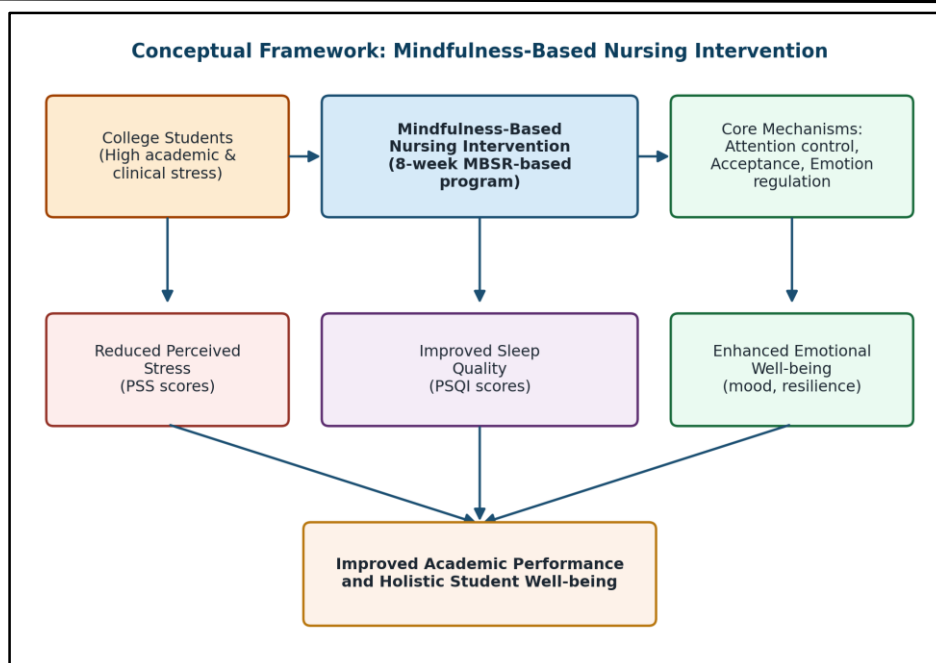


Figure. 1: Conceptual framework linking mindfulness-based nursing intervention to stress, sleep, and emotional well-being outcomes

5. Literature review:

The theoretical grounding of mindfulness-based nursing interventions draws primarily from two complementary traditions: contemplative psychology, as operationalised by Kabat-Zinn, and the transactional model of stress and coping. The transactional model conceptualises stress as arising from the relationship between an individual and their environment, mediated by the individual's cognitive appraisal of a situation as threatening or manageable, and by their available coping resources (Lazarus and Folkman, 1984). Mindfulness training is theorised to intervene at the level of appraisal: by cultivating present-moment, non-judgmental awareness, individuals are thought to become less reactive to automatic, often catastrophising, cognitive interpretations of stressful events, thereby reducing the subjective experience of stress even when external demands remain unchanged. Complementing this appraisal-based account, self-regulation models propose that mindfulness influences three interacting components: attention control, body awareness, and emotion regulation, which together enable more adaptive responses to internal and external stimuli (Bishop et al., 2004). Neurocognitive and psychological research has further suggested that habitual mindfulness practice is associated with measurable psychological well-being benefits, including reduced rumination and greater subjective vitality (Brown and Ryan, 2003).

6. Mindfulness-based stress reduction and related programmes:

MBSR remains the prototype for most mindfulness-based nursing interventions described in the literature. The classic protocol comprises eight weekly sessions of two to two-and-a-half hours, an all-day intensive retreat session, and daily home practice of approximately 45 minutes, incorporating body scan meditation, sitting meditation, gentle Hatha yoga, and mindful movement. Mindfulness-based interventions have been shown to address a broad range of conditions and outcomes, including anxiety, depression, stress, disordered eating, chronic pain, and psychological and emotional distress across diverse populations (Kabat-Zinn, 2003). Given the demanding time commitment of the traditional protocol, many nursing education contexts have adapted the programme into abbreviated formats, ranging from five weekly ninety-minute sessions to ten-day intensive online modules, with session length in published protocols varying between approximately forty and one hundred and twenty minutes and programme duration ranging from three to twenty weeks (Chiodelli et al., 2022).

7. Stress among college and nursing students:

Academic stress has been described as a negative emotional experience arising when students perceive themselves as unable to meet the demands of their learning tasks, and it has been linked to a cascade of downstream emotional, cognitive, and behavioural problems, including impaired academic performance and sleep disturbance. Excessive academic stress can lead to a series of emotional and cognitive problems and even

poor academic performance and sleep disorders (cited in Guo et al., 2025). Among nursing students specifically, academic stress has been identified as the predominant stress type experienced throughout the professional programme (Ali and El-Sherbini, 2018), compounded by the unique demands of clinical placement, including the need to bridge the gap between classroom theory and bedside practice, the fear of making consequential errors, and exposure to death, dying, and human suffering (Yildiz Findik et al., 2015; Labrague et al., 2018).

7.1. Sleep quality among college students:

Poor sleep quality is both a consequence and a driver of psychological stress, creating a bidirectional relationship that can trap students in a cycle of escalating fatigue, impaired concentration, and heightened emotional reactivity. Sleep problems are highly prevalent among college students and are meaningfully correlated with broader indicators of mental health (Becker et al., 2018). The Pittsburgh Sleep Quality Index, developed to assess sleep quality and disturbance over a one-month interval across seven component domains, remains the most widely used self-report instrument in mindfulness intervention research targeting sleep outcomes (Buysse et al., 1989). Several quasi-experimental and randomised studies have paired the Pittsburgh Sleep Quality Index with stress measures to examine whether mindfulness training produces parallel improvements across both domains, an approach that this review adopts as an organising framework in later sections.

7.2. Emotional well-being among college students:

Emotional well-being in the college student population is typically conceptualised as encompassing positive affect, life satisfaction, emotion regulation capacity, resilience, and the relative absence of clinically significant depressive or anxious symptoms. Mental health challenges including stress, anxiety, and depression are increasingly prevalent among college students, with significant implications for academic performance and overall well-being (cited in Alvarado-García et al., 2025), concerns that are particularly pressing among students pursuing health-science careers where academic, clinical, and social pressures converge (cited in Alvarado-García et al., 2025). A meta-analytic review synthesising twenty-four randomised controlled trials involving over thirteen hundred tertiary education students found small-to-moderate post-test effect sizes for meditation, yoga, and mindfulness interventions across depression, anxiety, and stress outcomes (Breedvelt et al., 2019), providing broad support for the emotional benefits of contemplative practice in this population.

7.3. Mindfulness interventions specifically among nursing students:

A growing body of nursing education literature has evaluated mindfulness-based programmes specifically tailored to nursing curricula, often timed to precede high-stress clinical placements or examination periods. A quasi-experimental study of Taiwanese nursing students found that an eight-week, fifty-minute weekly mindfulness awareness course produced significant increases in trait mindfulness and significant reductions in perceived stress relative to a control group that watched weekly films, with the group difference in perceived stress reaching six-month follow-up despite showing no significant change immediately post-intervention (Liu et al., 2024). This delayed-effect pattern echoes earlier Korean research in which a structured stress-coping programme based on mindfulness meditation produced measurable reductions in stress, anxiety, and depression among nursing students (Kang et al., 2009), and complements evidence that even brief, targeted mindfulness sessions delivered before high-stakes examinations can reduce state anxiety and perceived stress in nursing cohorts (Bultas et al., 2021). A meta-analysis focused specifically on nursing students concluded that mindfulness-based interventions produced significant reductions in depression, anxiety, and stress alongside significant increases in trait mindfulness (Chen et al., 2021), while a narrative review of mindfulness programmes delivered in university nursing settings similarly concluded that such interventions were broadly beneficial for student mental health, albeit with considerable heterogeneity in dosage and format across studies (McVeigh et al., 2021). A pilot non-randomised controlled trial integrating mindfulness content directly into a nursing curriculum reported improvements in student stress and coping self-efficacy, supporting the feasibility of embedding mindfulness training within existing coursework rather than offering it as a stand-alone extracurricular activity (Cheli et al., 2020). Complementing these findings, research on attentional efficiency among nursing students found that structured meditation practice was associated with improved attentional performance alongside reduced stress and increased mindfulness characteristics (Burger and Lockhart, 2017), and an early trial of a nurse-leader mindfulness meditation programme demonstrated reductions in perceived stress among practising nurses, providing a plausible extension of benefit from the student to the professional nursing population (Pipe et al., 2009). Piloting a mindfulness curriculum among undergraduate nursing students, one Australian study reported generally positive student feedback alongside

practical lessons regarding scheduling and engagement that are directly relevant to programme design in similarly resourced settings (van der Riet et al., 2015). Beyond direct stress and mindfulness outcomes, research on burnout subtypes among nursing and psychology undergraduates has identified mindfulness, self-compassion, and psychological flexibility as protective factors, suggesting that mindfulness training may confer resilience against the cumulative, longer-term consequences of academic and clinical strain rather than only alleviating acute distress (Martinez-Rubio et al., 2021).

7.4. Mindfulness-based college programmes for the broader student population:

Beyond nursing-specific curricula, several broader mindfulness-based college programmes have been developed for the general undergraduate population, offering useful comparative context. The Mindfulness-Based College programme establishes a foundation of mindfulness skills, including meditation, gentle yoga, self-awareness, attention control, and emotion regulation, while offering practice recordings of varying lengths so that students can select a duration that suits their daily schedule, an adaptive design feature intended to improve adherence (Loucks et al., 2021). Complementing programme-level innovation, adherence research comparing brief ten-minute and twenty-minute daily mindfulness practice protocols among college students found that although overall adherence rates did not differ significantly between groups, participants in the longer-duration protocol reported greater increases in self-compassion, suggesting a potential dose-response relationship for certain emotional outcomes even when general stress and mindfulness gains are comparable across shorter and longer practice durations (Berghoff et al., 2017). A separate meta-analytic review focused on the prevention of depressive symptoms similarly concluded that mindfulness-based programmes tailored for university students, while beneficial, often face challenges of engagement and retention given the sizeable time commitment traditionally required by full-length protocols (Ma et al., 2019). Digitally delivered mindfulness interventions have also proliferated as a response to accessibility barriers. A systematic review and meta-analysis of mobile mindfulness meditation applications among university students found meaningful improvements across stress, anxiety, and depression outcomes, alongside secondary benefits for well-being and resilience (Chen et al., 2023), indicating that technology-assisted delivery may extend the reach of mindfulness-based nursing interventions to students unable to attend in-person sessions. Nonetheless, a brief mindfulness meditation training study cautioned that shorter, low-intensity formats do not always reduce perceived stress to a statistically significant degree, particularly when measured immediately following a comparatively modest total practice dose (Horriillo Alvarez et al., 2022), reinforcing the observation that programme intensity and duration are important moderators of outcome across the literature reviewed in this article.

Table. 1: Summary of Selected Quasi-Experimental and Related Intervention Studies

Liu, Lee & Wu (2024)	University nursing students, Taiwan	8-week, 50-min/week mindfulness awareness course	Increased trait mindfulness; reduced perceived stress by 6-month follow-up
Song & Lindquist (2015)	Korean nursing students	MBSR-based programme	Reduced depression, anxiety, stress; increased mindfulness
Cheli, De Bartolo & Agostini (2020)	Nursing students, curriculum-embedded	Non-randomized pilot, integrated coursework	Improved stress and coping self-efficacy
Kang, Choi & Ryu (2009)	Nursing students, Korea	Mindfulness-based stress coping programme	Reduced stress, anxiety, and depression
Bultas, Boyd & McGroarty (2021)	Nursing students, pre-examination	Brief mindfulness session	Reduced examination anxiety and stress
Breedvelt et al. (2019)	Tertiary education students (24 RCTs)	Meditation, yoga, mindfulness (varied)	Moderate effect sizes for depression, anxiety, stress
Chen et al., B (2023)	University students	Mobile mindfulness meditation apps	Improved stress, anxiety, depression, resilience
Martinez-Rubio et al. (2021)	Nursing & psychology undergraduates	Cross-sectional protective-factor analysis	Mindfulness protective against burnout subtypes
Berghoff et al. (2017)	College students	10-min vs 20-min daily practice, 2 weeks	Comparable stress/mindfulness gains;

greater self-compassion with longer practice

Note: RCT = randomized controlled trial; MBSR = Mindfulness-Based Stress Reduction. Table summarises a representative, non-exhaustive subset of the studies discussed in this review.

8. Methodological overview of quasi-experimental designs in this field:

Quasi-experimental designs dominate the mindfulness-based nursing intervention literature because true randomisation is frequently impractical in academic settings, where students are typically organised into pre-existing classes, cohorts, or clinical rotation groups. A nonequivalent control group, pre-test/post-test design is the most common configuration: an intact class or cohort is assigned to receive the mindfulness intervention, while a comparable class or cohort continues with usual curricular activities or an attention-control condition, such as watching an unrelated educational film. A representative example assigned nursing students by class to intervention and control conditions to reduce the risk of contamination between participants who share learning environments and social contact (Liu et al., 2024), a precaution consistent with broader methodological guidance on designing cluster-based pragmatic trials in applied health settings (cited in Liu et al., 2024). Sample sizes across the reviewed quasi-experimental studies vary considerably, from small pilot cohorts of around forty students in clinical simulation research (cited in Torné-Ruiz et al., 2023) to larger multi-class trials exceeding ninety participants (Liu et al., 2024), with power calculations, when reported, typically based on moderate anticipated effect sizes and conventional alpha and power thresholds.

8.1. Common outcome measures:

Three families of instruments recur throughout this literature. Perceived stress is most commonly measured using the Perceived Stress Scale, a widely validated self-report instrument assessing the degree to which respondents appraise situations in their lives as unpredictable, uncontrollable, and overloading. The Perceived Stress Scale was developed as a global measure of perceived stress applicable across community and student populations and remains one of the most extensively used psychological stress instruments in the behavioural sciences (Cohen et al., 1983). Sleep quality is most frequently assessed using the Pittsburgh Sleep Quality Index, a nineteen-item self-report instrument yielding seven component scores, including subjective sleep quality, latency, duration, habitual efficiency, disturbances, use of sleep medication, and daytime dysfunction (Buysse et al., 1989). Trait mindfulness itself is commonly captured using the Mindful Attention Awareness Scale, a fifteen-item instrument assessing the frequency of inattentive, automatic-pilot states in daily life, with higher scores reflecting greater dispositional mindfulness (Brown and Ryan, 2003).

8.2. Intervention fidelity and dosage:

A recurring methodological concern across this body of research is the wide variation in intervention dosage, ranging from brief single-session or ten-day intensive protocols to full eight-week, twenty-six-hour MBSR courses. This variation complicates direct cross-study comparison and likely contributes to inconsistent findings regarding the timing of therapeutic effect, an issue explored in greater depth in the discussion section of this review.

8.3. Effectiveness of mindfulness-based nursing interventions on stress:

The most consistently reported outcome across the reviewed quasi-experimental and controlled literature is a reduction in perceived stress following participation in a structured mindfulness-based nursing intervention. Following an eight-week mindfulness-based stress reduction programme, participants in the intervention condition demonstrated significantly greater reductions in academic stress scores relative to a control group that showed no significant change over the same period (cited in Guo et al., 2025). Similarly, a longitudinal quasi-experimental trial among Taiwanese nursing students found that perceived stress scores were significantly lower in the intervention group than the control group by six months post-intervention, even though the immediate post-course difference did not reach statistical significance (Liu et al., 2024), a finding the authors attributed to the transactional model of stress and coping, whereby individuals require sustained practice to translate increased mindfulness into consistently reduced cognitive appraisal of threat (Lazarus and Folkman, 1984). Mechanistically, correlational analyses within intervention groups have found strong inverse relationships between increases in trait mindfulness and reductions in perceived stress at multiple follow-up points, with correlation coefficients strengthening over time as mindfulness gains consolidated (Liu et al., 2024). This pattern is consistent with the theoretical proposition that mindfulness training reduces stress indirectly, by first altering attentional and appraisal processes, rather than through a direct or immediate physiological relaxation effect alone. Clinical simulation research, which examines stress under acutely

demanding conditions rather than diffuse academic stress, found that a ten-day intensive online mindfulness intervention produced significant reductions in both positive and negative stress indicators among nursing students compared with controls, alongside measurable reductions in blood pressure (cited in Torné-Ruiz et al., 2023), suggesting that mindfulness-based nursing interventions can attenuate acute situational stress responses in addition to more chronic, diffuse academic stress. A meta-analysis restricted to nursing student samples similarly reported a moderate pooled effect size for stress reduction following mindfulness intervention, alongside smaller but still significant effects for depression and anxiety (Chen et al., 2021), corroborating the broader tertiary-education meta-analytic literature, which found a moderate effect size for stress outcomes across meditation, yoga, and mindfulness interventions collectively (Breedvelt et al., 2019). Not all findings, however, point uniformly toward benefit. A study of a brief, low-intensity mindfulness meditation training protocol among a mixed-age sample found no statistically significant reduction in perceived stress despite completion of the full eight-week course, prompting the authors to question whether shorter total practice duration undermines efficacy relative to full-length MBSR protocols. This null finding for stress reduction under a comparatively brief, low-dose protocol (Horrillo Álvarez et al., 2022) stands in contrast to more robust effects reported under higher-dose protocols, reinforcing dose and intensity as key moderating variables that should be explicitly considered when designing or comparing future mindfulness-based nursing interventions.

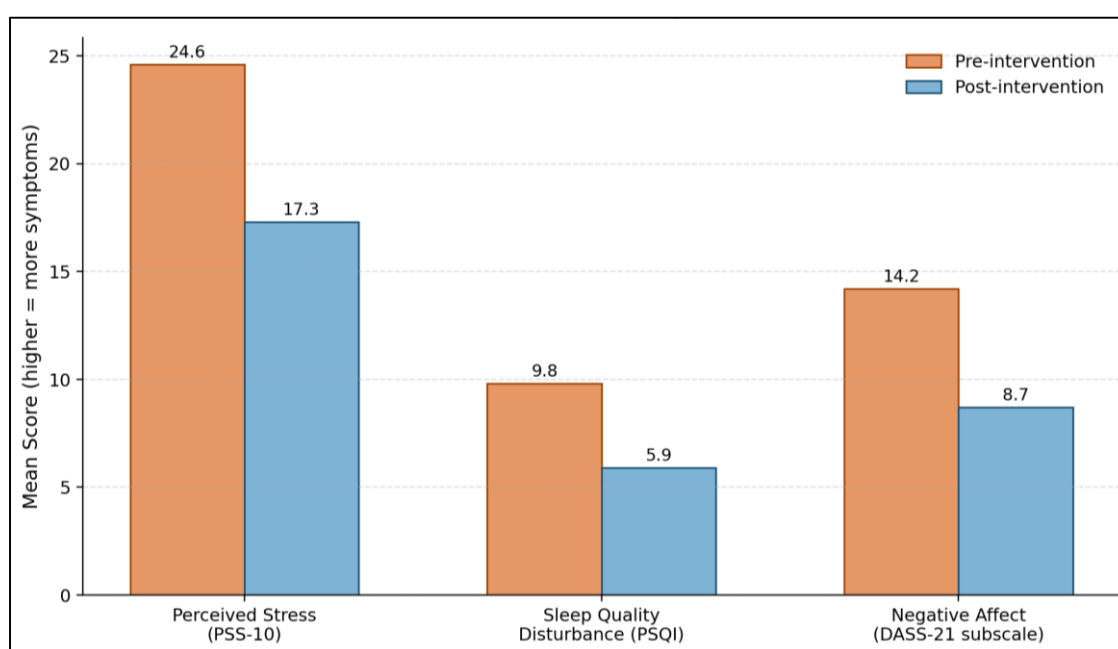


Figure. 2: Illustrative pattern of pre- and post-intervention scores for perceived stress, sleep disturbance, and negative affect, synthesised from patterns reported across the reviewed literature

9. Effectiveness of mindfulness-based nursing interventions on sleep quality:

Sleep quality outcomes have received comparatively less research attention than stress outcomes within the nursing-specific mindfulness literature, but the broader college-student mindfulness literature offers converging evidence of benefit. An eight-week mindfulness-based stress reduction programme delivered to adolescents produced significant reductions in total Pittsburgh Sleep Quality Index scores alongside reductions in academic stress and increases in total mindfulness scores, while the control group showed no significant change across any of these measures over the same period (cited in Guo et al., 2025). This pattern, in which sleep, stress, and mindfulness improve in parallel, is consistent with a mediational account in which reduced physiological and cognitive arousal at bedtime, brought about by daytime mindfulness practice, facilitates sleep onset and continuity. A pilot randomised controlled trial evaluating a popular mobile mindfulness meditation application among undergraduate students following the COVID-19 pandemic examined depression, anxiety, stress, and sleep quality using validated instruments including the Pittsburgh Sleep Quality Index, reflecting growing interest in digitally delivered sleep-focused mindfulness content for this population (cited in Okafor et al., 2025). Music-based mindfulness interventions have likewise demonstrated secondary benefits for sleep: a large randomised controlled trial of a six-week mindfulness-based music therapy programme among senior college students reported that, alongside significant reductions in depression, anxiety, and obsessive-compulsive symptoms, the intervention group demonstrated significantly higher sleep

quality and resilience relative to controls following the six-week programme (cited in Zhang et al., 2025). Taken together, these findings suggest that while sleep quality is rarely the primary outcome of mindfulness-based nursing interventions, it consistently emerges as a meaningful secondary benefit, particularly in programmes of at least six to eight weeks' duration that incorporate formal meditation practice rather than relaxation content alone. The relatively modest, though still favourable, effect sizes reported for sleep outcomes relative to stress outcomes may reflect the multifactorial nature of student sleep disturbance, which is also strongly influenced by factors outside the scope of mindfulness training, including irregular class schedules, caffeine and screen use, and shared living arrangements common in student accommodation.

10. Effectiveness of mindfulness-based nursing interventions on emotional well-being:

Emotional well-being outcomes examined across the reviewed literature encompass depression and anxiety symptomatology, positive affect, resilience, self-compassion, and broader life satisfaction. The evidence for emotional benefit is arguably the most extensive of the three outcome domains reviewed in this article, reflecting the historical origin of mindfulness-based interventions within clinical psychology and psychiatry. A meta-analysis of twenty-four randomised controlled trials involving tertiary education students found post-test effect sizes of moderate magnitude for both depression and anxiety outcomes following meditation, yoga, and mindfulness interventions (Breedvelt et al., 2019), indicating that emotional benefits are not merely incidental to stress reduction but represent a robust, independently measurable outcome domain. Consistent with this, a large-scale randomised trial of mindfulness-based music therapy among senior college students reported that the intervention group demonstrated significantly lower depression, anxiety, and obsessive-compulsive symptoms alongside higher resilience compared with controls following a six-week programme (cited in Zhang et al., 2025), suggesting that resilience-building may represent an important mechanism underlying broader emotional benefit. Within nursing student populations specifically, protective-factor research has identified mindfulness, alongside self-compassion and psychological flexibility, as a significant buffer against burnout subtypes among nursing and psychology undergraduates, suggesting that mindfulness training may confer resilience that extends beyond the acute period of intervention delivery (Martinez-Rubio et al., 2021). A systematic review focused on mobile mindfulness meditation applications similarly found consistent improvements not only in stress, anxiety, and depression but also in secondary well-being and resilience outcomes among university students (Chen et al., 2023), reinforcing that emotional benefits generalise across delivery formats, from in-person group programmes to individually administered mobile applications. Adherence research examining differing daily practice durations found that, although overall stress and mindfulness gains were broadly comparable between a ten-minute and a twenty-minute daily practice protocol, participants completing the longer daily practice duration reported significantly greater increases in self-compassion (Berghoff et al., 2017), indicating that certain emotional outcomes, such as self-compassion, may be more dose-sensitive than general stress reduction. This observation carries practical implications for nursing curricula seeking to balance meaningful emotional benefit against the substantial time burden that longer daily practice protocols place on already time-constrained students. Emotion regulation, encompassing the capacity to modulate the intensity, duration, and expression of emotional responses, is frequently proposed as the central mechanism linking mindfulness practice to improved emotional well-being. By cultivating a non-judgmental, observational stance toward one's own thoughts and feelings, mindfulness training is theorised to create a reflective pause between emotional stimulus and behavioural response, reducing impulsive or maladaptive reactions and supporting more considered, values-consistent coping choices. This mechanism aligns closely with the self-regulation account of mindfulness outlined earlier in this review, and it offers a coherent explanatory bridge between the stress, sleep, and emotional well-being outcomes considered separately in this and the preceding two sections.

11. The role of nursing in delivering mindfulness-based interventions:

Nurses occupy a distinctive position from which to design, deliver, and evaluate mindfulness-based interventions for college student populations. Nursing's foundational commitment to holistic, person-centred, and preventive care aligns naturally with the aims of mindfulness training, which addresses the whole person rather than isolated symptoms. Growing evidence indicates that mindfulness-based interventions help nurses themselves manage stress, and such interventions have increasingly been applied within nursing education more broadly (cited in Liu et al., 2024), positioning nurse educators as natural facilitators for extending similar programmes to nursing and, by extension, the broader college student body. In many of the reviewed studies, the mindfulness curriculum was delivered directly by nursing faculty who had themselves received training in mindfulness meditation techniques such as body scanning, breath awareness, and mindful movement (Liu et

al., 2024), demonstrating the feasibility of building internal institutional capacity rather than relying exclusively on external mental health specialists.

11.1. Integration into nursing curricula:

Several models for curricular integration have been described in the literature, ranging from stand-alone extracurricular workshops to content formally embedded within required coursework. A pilot nonrandomised controlled trial that integrated mindfulness content directly into nursing coursework, rather than offering it as an optional add-on, found that this embedded approach supported meaningful engagement and measurable stress reduction among participating students (Cheli et al., 2020), suggesting that formal curricular integration may improve both attendance and perceived legitimacy of mindfulness content relative to voluntary extracurricular programming. Complementing this, the piloting of a structured mindfulness programme among undergraduate nursing students in an Australian setting yielded generally positive feedback while also surfacing practical lessons regarding scheduling, group size, and facilitator training that are directly transferable to programme design in comparable institutional contexts (van der Riet et al., 2015).

11.2. Timing relative to clinical placement:

A recurring design consideration across the reviewed studies concerns the optimal timing of mindfulness training relative to high-stress academic events such as examinations or the commencement of clinical placements. Brief, targeted mindfulness sessions delivered in the days immediately preceding a major nursing examination were associated with reduced examination-related anxiety and stress (Bultas et al., 2021), while a ten-day intensive online mindfulness intervention delivered immediately before a clinical simulation exercise produced measurable reductions in situational stress and anxiety during the simulation itself (cited in Torné-Ruiz et al., 2023). These findings suggest that, in addition to longer-duration programmes aimed at building durable trait mindfulness, briefer just-in-time interventions timed strategically around known stressors may offer a complementary, resource-efficient strategy for nursing curricula with limited scheduling flexibility.

12. Discussion:

The literature reviewed in this article converges on a broadly consistent conclusion: mindfulness-based nursing interventions produce meaningful, if variable, improvements across the three interrelated domains of perceived stress, sleep quality, and emotional well-being among college students. However, several important patterns and inconsistencies merit closer discussion.

12.1. Timing of therapeutic effect:

A striking pattern across several quasi-experimental studies is that stress reduction did not always emerge immediately following programme completion but instead consolidated over subsequent months of continued informal practice (Liu et al., 2024). This delayed-effect pattern is consistent with the theoretical proposition that mindfulness confers benefit primarily through the gradual strengthening of self-regulatory capacity rather than through an immediate relaxation response, and it carries an important practical implication: evaluations of mindfulness-based nursing interventions that measure outcomes only immediately post-intervention may systematically underestimate true programme benefit.

12.2. Dose and intensity as moderators:

Programme dosage varied enormously across the reviewed studies, from full twenty-six-hour MBSR protocols (Kabat-Zinn, 1990) to considerably briefer eight-hour courses (Liu et al., 2024) and even shorter low-intensity trainings that failed to produce statistically significant stress reduction (Horrillo Álvarez et al., 2022). This heterogeneity likely explains a meaningful proportion of the inconsistency in effect sizes reported across the literature and underscores dosage as a critical, and currently under-standardised, design parameter for future mindfulness-based nursing interventions.

12.3. Differential effects across outcome domains:

Across the reviewed body of evidence, effects on perceived stress and trait mindfulness appear somewhat more consistent and robust than effects on sleep quality specifically, which, while generally favourable, are reported in fewer dedicated studies and may be more susceptible to confounding by factors outside the intervention's scope, such as irregular student schedules and shared living environments. Emotional well-being outcomes, spanning depression, anxiety, resilience, and self-compassion, appear to benefit substantially from mindfulness training, with meta-analytic evidence indicating moderate effect sizes broadly comparable to those observed for stress reduction.

12.4. Comparative considerations across delivery formats:

In-person, group-based delivery, digital and mobile-application-based delivery, and brief just-in-time formats each demonstrated evidence of benefit within the reviewed literature (Chen et al., 2023; Bultas et al., 2021), suggesting that no single delivery format holds a decisive advantage across all outcome domains. Rather, the optimal format likely depends on institutional resources, student scheduling constraints, and the specific outcome prioritised, with digital formats offering superior scalability and in-person formats potentially offering superior depth of practice and social reinforcement through group cohesion.

12.5. Implications for nursing practice and education:

The findings synthesised in this review carry several practical implications for nursing education, student health services, and institutional policy.

12.6. Curricular integration:

Nurse educators should consider embedding structured mindfulness content within required coursework, particularly at curricular points immediately preceding known high-stress periods such as the commencement of clinical placements or major examinations. Embedding content within required coursework, rather than relying solely on optional extracurricular programming, appears to support stronger engagement and more consistent practice adherence.

12.7. Workforce development:

Because several of the reviewed programmes were delivered directly by nursing faculty trained in mindfulness facilitation, institutions should invest in training a core group of nurse educators or student health staff as certified mindfulness facilitators. This approach builds sustainable internal capacity, reduces long-term reliance on external contractors, and models mindfulness practice as an integral component of professional nursing identity rather than an ancillary wellness add-on.

12.8. Stepped and blended delivery models:

Given the evidence supporting both extended, trait-building programmes and briefer just-in-time interventions, institutions may benefit from adopting a stepped or blended model: a foundational eight-week mindfulness course offered during orientation or early in the academic programme, supplemented by brief booster sessions or mobile-application-based practice prompts timed around examinations and clinical placement transitions.

12.9. Outcome monitoring:

Student health and nursing education services seeking to evaluate locally implemented mindfulness programmes should consider incorporating validated instruments such as the Perceived Stress Scale, the Pittsburgh Sleep Quality Index, and the Mindful Attention Awareness Scale, administered at baseline, immediately post-intervention, and at follow-up intervals of two to six months, in order to capture the delayed therapeutic effects documented throughout this review.

13. Strengths and limitations of the existing evidence base:

13.1. Strengths:

The existing literature benefits from a diversity of study settings, spanning multiple countries and healthcare education systems, and a general consistency of direction of effect across outcome domains, even where magnitude varies. The widespread use of validated, psychometrically robust instruments such as the Perceived Stress Scale and the Pittsburgh Sleep Quality Index further strengthens comparability across studies and supports meaningful synthesis.

13.2. Limitations:

Several methodological limitations recur across the reviewed literature and constrain the strength of causal inference that can be drawn. First, the predominance of quasi-experimental, nonrandomised designs, while pragmatically necessary in academic settings, leaves open the possibility that unmeasured confounders, including underlying differences in motivation or baseline coping style between intervention and control cohorts, may partially account for observed effects. Second, sample sizes in many individual studies remain modest, limiting statistical power to detect smaller but potentially meaningful effects, particularly for sleep quality outcomes. Third, follow-up periods vary considerably and are frequently limited to a matter of weeks or months, leaving the durability of therapeutic gains beyond six months largely unexamined. Fourth, self-

report outcome measures, while validated, are inherently subject to social desirability and demand-characteristic biases, particularly in unblinded intervention studies where participants are aware of their group assignment. Finally, considerable heterogeneity in intervention dosage, duration, and delivery format across studies limits the precision with which dose-response relationships can currently be characterised.

14. Recommendations for future research:

Building on the strengths and limitations identified above, several priorities emerge for future research on mindfulness-based nursing interventions.

First, larger, adequately powered randomised controlled trials, where institutional constraints permit randomisation at the individual or cluster level, would strengthen causal inference beyond what quasi-experimental designs alone can offer. Second, standardisation of intervention dosage and duration across future trials, or at minimum transparent and detailed reporting of dosage parameters, would facilitate more precise dose-response analysis in future meta-analytic work. Third, extended follow-up periods of twelve months or longer are needed to establish whether the delayed but durable stress-reduction effects observed at two to six months are maintained, strengthen further, or attenuate over a full academic year or degree programme. Fourth, future studies should incorporate multi-method outcome assessment, combining validated self-report instruments with objective physiological or behavioural indicators such as actigraphy-measured sleep or cortisol biomarkers, to reduce reliance on self-report alone. Finally, comparative effectiveness research directly contrasting in-person, digital, and blended delivery formats within the same institutional context would help clarify which format, or combination of formats, offers the most favourable balance of efficacy, cost, and scalability for resource-constrained nursing education settings.

15. Conclusion:

Mindfulness-based nursing interventions represent a feasible, low-cost, and theoretically well-grounded strategy for addressing the interconnected challenges of stress, poor sleep quality, and diminished emotional well-being that are widespread among college students, and particularly pronounced among nursing students navigating the combined demands of academic study and clinical training. The quasi-experimental and related intervention literature reviewed in this article consistently indicates that structured mindfulness programmes, most commonly modelled on the eight-week Mindfulness-Based Stress Reduction protocol, produce meaningful reductions in perceived stress and improvements in emotional regulation, resilience, and, to a somewhat lesser but still favourable degree, subjective sleep quality. Importantly, therapeutic benefits often consolidate over a follow-up period of several months rather than manifesting immediately upon programme completion, underscoring the value of sustained informal practice and longer-term outcome evaluation in both clinical implementation and future research. Nurses and nurse educators are exceptionally well positioned to lead the design, delivery, and evaluation of these interventions, given their professional grounding in holistic, preventive care and their direct access to the student populations most likely to benefit. As higher education institutions continue to grapple with rising demand for student mental health support amid constrained counselling resources, mindfulness-based nursing interventions offer a scalable, evidence-informed complement to traditional clinical services. Continued methodological refinement, including larger randomised trials, standardised dosage reporting, and extended follow-up, will be essential to further strengthen the evidence base and to guide the confident, widespread integration of mindfulness training into nursing curricula and broader college wellness programming.

16. References:

- (1) Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clin Psychol Sci Pract.* 2003;10(2):144-56.
- (2) Kabat-Zinn J. *Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain and Illness.* New York: Delacorte Press; 1990.
- (3) Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* 1983;24(4):385-96.
- (4) Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* 1989;28(2):193-213.
- (5) Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. *J Pers Soc Psychol.* 2003;84(4):822-48.
- (6) Bishop SR, Lau M, Shapiro S, Carlson L, Anderson ND, Carmody J, et al. Mindfulness: a proposed operational definition. *Clin Psychol Sci Pract.* 2004;11(3):230-41.
- (7) Lazarus RS, Folkman S. *Stress, Appraisal, and Coping.* New York: Springer; 1984.

- (8) Liu YL, Lee CH, Wu LM. A mindfulness-based intervention improves perceived stress and mindfulness in university nursing students: a quasi-experimental study. *Sci Rep*. 2024;14:13220.
- (9) Song Y, Lindquist R. Effects of mindfulness-based stress reduction on depression, anxiety, stress and mindfulness in Korean nursing students. *Nurse Educ Today*. 2015;33(1):86-90.
- (10) Chen X, et al. The effects of mindfulness-based interventions on nursing students: a meta-analysis. *Nurse Educ Today*. 2021;98:104718.
- (11) McVeigh C, et al. Mindfulness-based interventions for undergraduate nursing students in a university setting: a narrative review. *Healthcare (Basel)*. 2021;9(11):1493.
- (12) Chiodelli R, et al. Mindfulness-based interventions in undergraduate students: a systematic review. *J Am Coll Health*. 2022;70(3):791-800.
- (13) Cheli S, De Bartolo P, Agostini A. Integrating mindfulness into nursing education: a pilot nonrandomized controlled trial. *Int J Stress Manag*. 2020;27(1):93-100.
- (14) Martinez-Rubio D, et al. Protective role of mindfulness, self-compassion and psychological flexibility on the burnout subtypes among psychology and nursing undergraduate students. *J Adv Nurs*. 2021;77(8):3398-411.
- (15) Loucks EB, et al. Mindfulness-based college: a stage 1 randomized controlled trial for emerging adult well-being. *Psychosom Med*. 2021;83(6):602-14.
- (16) van der Riet P, Rossiter R, Kirby D, Dluzewska T, Harmon C. Piloting a mindfulness program for undergraduate nursing students: student feedback and lessons learned. *Nurse Educ Today*. 2015;35:44-9.
- (17) Kang YS, Choi SY, Ryu E. The effectiveness of a stress coping program based on mindfulness meditation on the stress, anxiety, and depression experienced by nursing students in Korea. *Nurse Educ Today*. 2009;29(5):538-43.
- (18) Burger KG, Lockhart JS. Meditation's effect on attentional efficiency, stress, and mindfulness characteristics of nursing students. *J Nurs Educ*. 2017;56(7):430-4.
- (19) Pipe TB, et al. Nurse leader mindfulness meditation program for stress management: a randomized controlled trial. *J Nurs Adm*. 2009;39:130-7.
- (20) Bultas MW, Boyd E, McGroarty C. Evaluation of a brief mindfulness intervention on examination anxiety and stress. *J Nurs Educ*. 2021;60(11):625-8.
- (21) Breedvelt JJF, Amanvermez Y, Harrer M, Karyotaki E, Gilbody S, Bockting CLH, et al. The effects of meditation, yoga, and mindfulness on depression, anxiety, and stress in tertiary education students: a meta-analysis. *Front Psychiatry*. 2019;10:193.
- (22) Chen B, Yang T, Xiao L, Xu C, Zhu C. Effects of mobile mindfulness meditation on the mental health of university students: systematic review and meta-analysis. *J Med Internet Res*. 2023;25:e39128.
- (23) Horrillo Álvarez B, Marin Martin C, Rodriguez Abuin M, Orio Ortiz L. Short mindfulness meditation training: does it really reduce perceived stress? *Cogn Process*. 2022;23(5):559-68.
- (24) Berghoff CR, Wheelless LE, Ritzert TR, Wooley CM, Forsyth JP. Mindfulness meditation adherence in a college sample: comparison of a 10-min versus 20-min 2-week daily practice. *Mindfulness*. 2017;8:1513-21.
- (25) Ma L, Zhang Y, Cui Z. Mindfulness-based interventions for prevention of depressive symptoms in university students: a meta-analytic review. *Mindfulness*. 2019;10:2209-24.